

**CLAIMS**

The invention, in which an exclusive property of right I claim, is defined by the claims as follows:

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1-A method of automatically ironing textile articles and the like for both domestic and industrial purposes by

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increasing the pressure, temperature, humidity of the air inside a container in which the textile articles and the like are placed to a pre-selected level by producing steam and guiding it into the container(10), compressing air and guiding the compressed air into the container(10), heating the air in the container(10) in wet ironing stage, and/or by compressing air and guiding the compressed air into the container(10), heating the air in the container(10) in dry ironing stage,

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then, providing a rest period by stopping the operation for a pre-selected time so that the textile articles and the like remain at pre-selected levels in high-temperature, high-humidity, high-pressure air in wet ironing stage and/or in high-temperature, high-pressure air in dry ironing stage in order to achieve proper dewrinkling,

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removing excess heat and/or humidity from the textile articles and the like before ironing process is completed.

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2-A method for automatically ironing textile articles and the like for both domestic and industrial ironing machines, as claimed in claim 1, comprising the following stages, and steps of these stages are:

Stage A- Wet ironing stage

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- controlling if the doors of the apparatus(7, 31) are closed or not,
- starting to introduce water from the supply to the system if the doors of the apparatus(7, 31) are closed,

- heating the water to produce steam and transferring steam to humidify the textile articles and the like, until a pre-selected humidity level suitable for humidifying the textile articles and the like is reached,
- 5 • compressing air into the system to increase the air pressure to a pre-selected pressure level suitable for dewrinkling,
- stopping to compress air when a pre-selected level of air pressure is reached,
- heating the air in the system until a pre-selected temperature level is reached,
- measuring the temperature of the air during wet ironing stage,
- 10 • stopping to heat the air in the system when measured level of the temperature of the air is equal to or greater than a pre-selected temperature level,
- providing a rest period in order to have enough time for the textile articles and the like to remain in high-temperature, high-humidity, and high-pressure air at pre-selected levels in order to achieve proper dewrinkling ,
- discharging high-temperature, high-humidity, and high-pressure air,

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#### Stage B- Dehumidifying stage

- starting dehumidifying cycle to remove excess humidity from the textile articles and the like,
- 20 • starting the refrigeration cycle,
- circulating the air through a refrigerating system for dehumidifying high-temperature, high-humidity air ,
- measuring the quantity of water released from the textile articles and the like during dehumidifying process,
- 25 • continuing to cool, dehumidify, and heat the air in order to dry the textile articles and the like completely until measured level of condensation is equal to or lower than a pre-selected level,
- stopping to circulate the air through the refrigerating system when measured level of condensation is equal to or greater than a pre-selected level,
- 30 • stopping refrigerating cycle,

#### Stage C- Dry ironing stage

- controlling if the doors of the apparatus(7, 31) of the apparatus are closed or not,
- compressing air into the system to increase air pressure to a pre-selected level suitable for dewrinkling and/or drying,
- stopping to compress air when a pre-selected level of air pressure is reached,
- starting to heat the air until a pre-selected temperature level is reached,
- measuring the temperature of the air during dry ironing stage,
- stopping to heat the air when measured level of the temperature of the air is equal to or greater than a pre-selected temperature level,
- providing a rest period in order to have enough time for the textile articles and the like to remain in high-temperature, high-pressure air at pre-selected levels in order to achieve proper dewrinkling,
- discharging high-temperature, high-pressure air,

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#### Stage D- Cooling stage

- starting cooling cycle to remove excess heat from the textile articles and the like,
- starting the refrigeration cycle,
- circulating the air through the refrigerating system for cooling high-temperature air ,
- measuring the temperature of the air during cooling process,
- continuing to cool the air in order to dry the textile articles and the like completely until measured level of temperature level is equal to or lower than a pre-selected level,
- stopping to circulate the air through refrigerating system when measured level of temperature level is equal to or greater than a pre-selected level,
- stopping the refrigerating cycle,

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#### Stage E- Finishing stage

- stopping the ironing cycle,

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- measuring the temperature and pressure of the air,
- keeping the textile articles and the like locked until measured level of the temperature and pressure of the air is equal to or greater than a pre-determined level which is safe for the users,
- 5      • unlocking.

3- A method for automatically ironing textile articles and the like as claimed in claim 1 and/or claim 2 wherein said Stage A, Stage B, Stage C, Stage D, and Stage E may be used for dewrinkling of textile articles and the like with high-temperature, high-  
10 humidity, and high-pressure air in wet ironing mode, and/or said Stage C, Stage D, and Stage E may be used for dewrinkling of textile articles and the like with high-temperature, high-pressure air in dry ironing mode.

4-An apparatus for automatically ironing textile articles and the like for both domestic  
15 and industrial ironing machines suitable to carry out the method as claimed in any of the previous claims 1 to 3 comprising

- an electronic control unit(1) to control the operation of the ironing machine,
- a box like ironing unit (2) comprised of opposite side surfaces at the left and right( 3a and 3b), a top surface(4), a rear surface(5), and a front surface(6)  
20 locations of which are defined with respect to the user, a door (7) on said front surface(6) or said side surfaces at the left and right( 3a and 3b) locking and unlocking of which is operated by said electronic control unit(1), a base part (8) at the bottom of said front surface(6), and a control-panel(9) on said front surface(6) and a container(10) for receiving textile articles and the like into its  
25 inner chamber,
- a heating system(11), to generate steam and to heat the air inside said container(10),
- an air injection-exhaustion system(12), which injects air into said container and exhausts therefrom,
- 30 • a water supplying system(13) for supplying water to the system which is actuated and stopped by said electronic control unit(1),
- a steam generating system(14), to humidify the air inside said container(10),

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- a temperature detecting means(15a) for detecting the temperature of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said temperature detecting means(15a),
  - 5     • a pressure detecting means(16a) for detecting the pressure of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said pressure detecting means(16a),
  - a humidity detecting means(17) for detecting the humidity of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said humidity detecting means(17),
  - 10     • a condensation detecting means(18) for detecting the quantity of water released from the clothes items and the like during the dehumidifying stage-Stage B,
  - an air compressor (19) configured and mounted so as to occupy very low height and disposed below bottom of said container(10) in said base-part(8),
  - a compressed air storage tank(20) coupled to said air compressor(19),
  - 15     • a refrigerating system(21) in order to cool the textile articles and the like and/or to remove excess humidity from them,
  - an air supply conduit (22), and air discharge conduit (23a, and 23b)
  - a water supply conduit (24), and water discharge conduit (25)
- 20     5- An apparatus for automatically ironing textile articles and the like for both domestic and industrial ironing machines suitable to carry out the method as claimed in any of the previous claims 1 to 3 comprising
- an electronic control unit(1) to control the operation of the ironing machine,
  - a box like ironing unit (2) comprised of opposite side surfaces at the left and right( 3a and 3b), a top surface(4), a rear surface(5), and a front surface(6)
  - 25     locations of which are defined with respect to the user, a door (7) on said front surface(6) or said side surfaces at the left and right( 3a and 3b) locking and unlocking of which is operated by said electronic control unit(1), a base part (8) at the bottom of said front surface(6), and a control-panel(9) on said front
  - 30     surface(6) and a container(10) for receiving textile articles and the like into its inner chamber,

- a heating system(11), to generate steam and to heat the air inside said container(10),
- an air injection-exhaustion system(12), which injects air into said container(10) and exhausts therefrom,
- 5 • a water supplying system(13) for supplying water to the system which is actuated and stopped by said electronic control unit(1),
- a steam generating system(14), to humidify the air inside said container(10),
- a temperature detecting means(15a) for detecting the temperature of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said temperature detecting means(15a),
- 10 • a pressure detecting means(16a) for detecting the pressure of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said pressure detecting means(16a),
- a humidity detecting means(17) for detecting the humidity of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said humidity detecting means(17),
- 15 • a condensation detecting means(18) for detecting the amount of water released from the clothes items and the like during the dehumidifying stage-Stage B,
- an air compressor (19) configured and mounted so as to occupy very low height and disposed below bottom of said container(10) in said base-part(8),
- 20 • a compressed air storage tank(20) coupled to said air compressor(19),
- a refrigerating system(21) in order to cool the textile articles and the like and/or to remove excess humidity from them,
- an air supply conduit (22), and air discharge conduit(23a, and 23b) attached to casing of said container(10),
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6- An apparatus for automatically ironing textile articles or the like as claimed in the previous claims 4 and/or 5 wherein all the steps of ironing are taking place in a box like unit(2) which is insulated for heat loss and safety in accordance with well known manufacturing methods, comprised of

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- a container(10) for receiving clothes and other textile articles which is resistant to high-temperature, high-humidity, and high-pressure, and which has opposite

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side surfaces at the left and right(26a and 26b), a top surface(27), a rear surface(28), a bottom surface(29) and a front surface(30) locations of which are defined with respect to the user,

- 5 • a door(31) on said front surface(30) or said side surfaces at the left and right(26a and 26b) of said container(10) which is resistant to high-temperature, high-humidity, and high-pressure, and assuring a perfect closure tightness,
- a rack(32), which is fixed to said side surfaces(26a and 26b) of said container(10) and to which plurality of hangers(33) are attached for supporting clothes item and the like within the inner chamber of said container(10),
- 10 • a discharge conduit(34) connected preferably to the center of said top surface(27) of said container(10),
- a temperature detecting means(15a), a pressure detecting means(16a), a humidity detecting means(17) mounted to said discharge conduit(34) to measure the level of temperature, pressure and humidity in said container,

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7- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 to 6 wherein said air injection-exhaustion system(12) which expels approximately evenly distributed streams of air into said container(10) to increase air pressure inside its inner chamber, comprises

- 20 • an air compressor(19) disposed below said container(10) configured and mounted so as to occupy very low height in said base part(8),
- a compressed air storage tank(20) coupled to said air compressor(19),
- air injection manifold(35),
- air distribution conduits (36a and 36b) preferably located on said rear side of the bottom surface(29) of said container(10) comprised of a first air distribution
- 25 conduit(36a) coupled to said air compressor(19) and vertically coupled preferably at the back of said rear surface(28) of said container(10), and a second distribution conduit(36b) perpendicularly coupled to said first distribution conduit(36a)
- 30 • a plurality of parallelly spaced conduits(37a, 37b, 37c, 37d, 37e, and 37f), perpendicularly coupled to second distribution conduit(36b) and perpendicular to said rear surface(28) of said container(10) and parallel to said bottom

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surface(29) of said container(10); each of which has formed therein a plurality of spaced air vents(38a, 38b, 38c, 38d, 38e, etc.) and each of which has a length extending from said front surface(30) to said rear surface(28) of said container(10),

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- a discharge conduit(34) connected preferably to the center of said top surface(27) of said container(10),
  - a lint filter(39) for removing lint from the air circulating in the system which is provided detachably in front of said discharge conduit(34),
  - an air supply conduit(22) and an air discharge conduit(23a and 23b),

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8- An apparatus for automatically ironing textile articles or the like as claimed any of the previous claims 4 to 6 wherein said air injection-exhaustion system(12) which expels approximately evenly distributed streams of air into said container(10) to increase air pressure inside its inner chamber, comprises

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- an air compressor(19) disposed below said container(10) configured and mounted so as to occupy very low height in said base part(8),
  - a compressed air storage tank(20) coupled to said air compressor(19),
  - air distribution conduits (36a and 36b) preferably located on said rear side of the bottom surface(29) of said container(10) comprised of a first air distribution

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conduit(36a) coupled to said air compressor(19) and vertically coupled preferably at the back of said rear surface(28) of said container(10), and a second distribution conduit(36b) perpendicularly coupled to said first distribution conduit(36a)

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    - a plurality of parallelly spaced conduits(37a, 37b, 37c, 37d, 37e, and 37f ) perpendicularly coupled to second distribution conduit(36b) and perpendicular to said rear surface(28) of said container(10) and parallel to said bottom surface(29) of said container(10), each of which has formed therein a plurality of spaced air vents(38a, 38b, 38c, 38d, 38e, etc.) and each of which has a length extending from said front surface(30) to said rear surface(28) of said

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container(10),

      - a discharge conduit(34) connected preferably to the center of said top surface(27) of said container(10),



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- a lint filter(39) for removing lint from the air circulating in the system which is provided detachably in front of said discharge conduit(34),
- an air supply conduit(22) and an air discharge conduit(23a and 23b),

5 9- An apparatus for automatically ironing textile articles and the like as claimed in any of the previous claims 4 to 8 wherein parallelly spaced conduits(37a, 37b, 37c, 37d, 37e, and 37f) comprised of a pipe and the like on which there are a plurality of spaced air vents(38a, 38b, 38 c, 38d, 38e, etc) the sizes of which increase towards the end of the pipe which is further away from said second distribution conduit(36b) so that air expels  
10 upwards, and sideways therefrom with approximately equivalent pressure towards textile items and the like in said container(10),

10- An apparatus for automatically ironing textile articles and the like as claimed in any of the previous claims 4 to 8 wherein said air injection-exhaustion system(12)  
15 comprises of two sets of parallelly spaced conduits, one of which (37a, 37b, 37c, 37d, 37e, and 37f) is parallel to said bottom surface(29) of said container(10), the second of which (38g, 38h, 38i, 38j, 38k, and 38l) is parallel to top surface(27) of said container(10), above the said hangers(33), and which are perpendicularly coupled to said second distribution conduit(36b) vertically coupled preferably at the back of said  
20 bottom surface(29),

11- An apparatus for automatically ironing textile articles and the like as claimed in any of the previous claims 4 to 6 wherein said steam generating system(14) comprises

- a steam generating tank(40) for producing steam to humidify the textiles articles and the like in said container(10)  
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- a water tank(41) connected to said a steam generating tank(40) which is advantageously removable through a lid(42) to put in demineralized water and/or normal water and also to allow the demineralized water produced during the dehumidifying process to be used for known purposes,
- a pump(43) coupled to said water tank(41) for draining the excess water from  
30 said water discharge conduit(25),

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- a water amount detecting means(44) for measuring the quantity of stored water in said water tank(41),

5 12- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 to 6 wherein said heating system(12) which comprises

- a heater (45a) to increase the temperature of the air inside said container(10) until a pre-determined level of temperature is maintained during ironing cycle, which is connected to an electrical box-not shown- mounted in said base part(8) from which suitable wiring is provided,
- 10 • a temperature detecting means(15a) for detecting the temperature of the air inside said container(10) which is actuated and stopped by said electronic control unit(1) responsive to said temperature detecting means(15a),
- 15 • a heater (45b) to heat the water in said steam generating tank(40) for producing steam in order to humidify the textile articles and the like in said container(10) which is connected to said electrical box-not shown- mounted on said bottom surface from which suitable wiring is provided,

13- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 to 6 wherein a refrigerating system(21) is comprised of evaporator(46) in an air cooling tank(47), condenser(48) in an air heating tank(49), an expansion valve(50), and a compressor(51) to compress the refrigerant circulating in the refrigerating system, all of which are connected to each other with pipes and the like, a ventilation box(52) to circulate cool air through said air heating tank(49) by means of a fan and a fan motor (not shown) as used in conventional air conditioners in order to cool the condenser(48), a water tank(41) to collect the condensed water during dehumidification stage which is connected to both said air cooling tank(49) and said steam generating tank(40) with a pipe,

30 14- An apparatus for automatically ironing textile articles or the like as claimed in the previous claims 4 to 6 wherein all the steps of ironing are taking place in a box like structure (2) which is insulated for heat loss and safety in accordance with well known

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manufacturing methods, comprised of a base part (8) at the bottom of said container(10) in which there is said air compressor (19), said compressed air storage tank(20), said steam generating tank(40), said water tank(41) said pump(43), and said air heating tank(49), configured and mounted so as to occupy very low height in said  
5 base part(8),

15- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 to 6 wherein the operation of the ironing processes is controlled by a multitude of valves(53a, 53b, 53c, 53d, 53e, 53f, 53g, 53h, 53i, 53j,  
10 53k, 53l, 53m, 53n, 53o, 53p, 53r, 53s, 53t and 50),

16- An apparatus for automatically ironing textile articles or the like as claimed in the previous claims 4 and/or 5 wherein said electronic control unit(1) is a microprocessor circuit receiving input signals from temperature detecting means(15), pressure detecting  
15 means(16), humidity detecting means(17), condensation detecting means(18), water amount detecting means(44), the door sensors-not shown- coupled to said door(7) of said box like unit(2) and said door(31) of said container(10) as utilized in conventional washing machines, and control panel(9), and sending output signals to drive circuits for activating and stopping the related valves(53a, 53b, 53c, 53d, 53e, 53f, 53g, 53h, 53i,  
20 53j, 53k, 53l, 53m, 53n, 53o, 53p, 53r, 53s, 53t and 50), compressors(19 and 51), pump(43), fan motor-not shown- doors(7 and 31) and the like in order to control:

- closing and opening of a power feed line-not shown,
- locking and unlocking of said door(7) of said box like unit(2) and said door(31) of said container(10),
- 25 • starting and stopping all the stages of ironing cycle, Stages A, B, C, D and E,
- operation of the air injection-exhaustion system(12),
- operation of steam generating system(13),
- operation of heating system(14),
- operation of refrigerating system(21) for cooling and/or dehydrating of textile  
30 articles and the like,.

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17- An apparatus for automatically ironing textile articles and the like as claimed in any of the previous claims 4 to 6 wherein said rack(32) which may also be slidable along guides(54a, 54b, 54c, and 54d) located at the top(27) or sides(26a and 26b) or both top(27) and sides(26a and 26b) of said container(10) is comprised of four horizontal bars(55a, 55b, 55c, and 55d,) sliding along said guides(54a, 54b, 54c, and 54d) on the top and bottom of both sides(26a and 26b) of said container(10) connected with four vertical bars(56a, 56b, 56c, and 56d) and two perpendicular horizontal bars(57a and 57b) combining the two sides of the rack on which plurality of hangers(33) are attached for supporting clothes items and the like within the interior region of said container(10),

18- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 to 6 wherein said rack(32) which may also be slidable along guides(54a and 54b) located at the top(27) or sides(26a and 26b) or both top(27) and sides(26a and 26b) of said container(10) is comprised of two horizontal bars(55a and 55b) sliding along said guides(54a and 54b) on the top of both sides(26a and 26b) of said container(10) connected perpendicularly with a horizontal bar(57) combining the two sides of the rack on which plurality of hangers(33) are attached for supporting clothes items and the like within the interior region of said container(10),

19- An apparatus for automatically ironing textile articles or the like as claimed in the previous claims 4 and/or 5 wherein electronic control unit(1) starts ironing program after receiving signals from the door sensors that both doors(7 and 31) are closed and unlocks said doors(7, 31) of said box like unit(2) and said container(10) if the measured level of temperature inside said container(10) is equal to or lower than a pre-determined level and the level of pressure inside said container(10) is equal to or lower than a pre-determined level in order to provide maximum safety for the users,

20- An apparatus for automatically ironing textile articles or the like as claimed in any of the previous claims 4 and/or 5 and/or 16 wherein said electronic control unit(1) which operates and controls the whole process of the ironing is connected to said

control panel(9) on the upper part of said front surface(6) of said box like structure(2) to receive input signals from the buttons of said control panel(9).

21- An apparatus for automatically ironing textile articles or the like as claimed in any  
5 of the previous claims 4 and/or 5 and/or 20 wherein said control-panel(9) of said electronic control unit(1) is comprised of an on/off button(58), wet/dry button(59) for dewrinkling in wet ironing mode which is signified by bluish/yellowish color or the like and which starts Stage A, Stage B, Stage C, Stage D, and Stage E one after another when in use, or for dewrinkling in dry ironing mode which is signified by yellowish  
10 color or the like and which starts Stage C, Stage D, and Stage E one after another when in use, a humidity level button(60) for setting the required humidity level ranging from no-humidity, to low-humidity, medium-humidity, and high-humidity, a temperature level button(61) for setting the desired temperature which is suitable for the fabrics of the items inside said container(10), a pressure level button(62) for setting the required  
15 pressure level ranging from low pressure, to medium pressure, and high pressure suitable for clothes items and the like, the pressure always being above the atmospheric pressure, a timer (63a) being capable of setting the duration of rest period in wet mode of the ironing process in short, medium, and long periods which is signified by bluish color or the like, and a second timer (63b) being capable of setting the duration of rest  
20 period in dry mode of the ironing process in short, medium, and long periods which is signified by yellowish color or the like,

22- A method for automatically ironing textile articles and the like as claimed in the previous claims 2 and/or 3 wherein the level of condensation is evaluated on the basis  
25 of measuring the quantity of water released from the clothes items and the like during the dehumidification stage and generating signals based on this measurement, signals being fed to said electronic control unit(1),

23- An apparatus for automatically ironing textile articles or the like suitable to carry  
30 out the method as claimed in the previous claims 1 to 5 wherein the ironing operation may be of two types, an integral system or split system as utilized in conventional air conditioners and all said elements of the ironing machine(from 1 to 63) is alternatively

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arranged in a system similar to conventional split system air conditioners in which air compressor(19), ~~compressed air storage tank(20), condensor(48), and air heating tank(49)~~ are placed in a second box like unit(64), said box like unit(64) being placed outside the wall behind the box like unit(2) in which dewrinkling of the textile items  
5 and the like is done automatically as in previous claims.

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